

Imaging option

Pinhole camera and mirrors

link: Cambridge press study guide:

<http://ibdiploma.cambridge.org/books/phys6/3/planner>

Activity:

1. Go into the lab, get a tall bulb, a screen with a hole in it and a piece of paper.

Shine the light through the pinhole and measure:

h_o - size of the object - the filament of the bulb

h_i - size of the image on the piece of paper

u or d_o - distance from the object to the optical device (pinhole).

v or d_i - distance to the piece of paper from the pinhole.

Derive an equation relating the variables.

Draw a ray diagram - re-derive the equation.

2. Look in various mirrors and write your observations:

- a) plane mirror - flat. Predict the smallest mirror that will show your whole body.
- b) convex mirror- bulges out - used for sideview

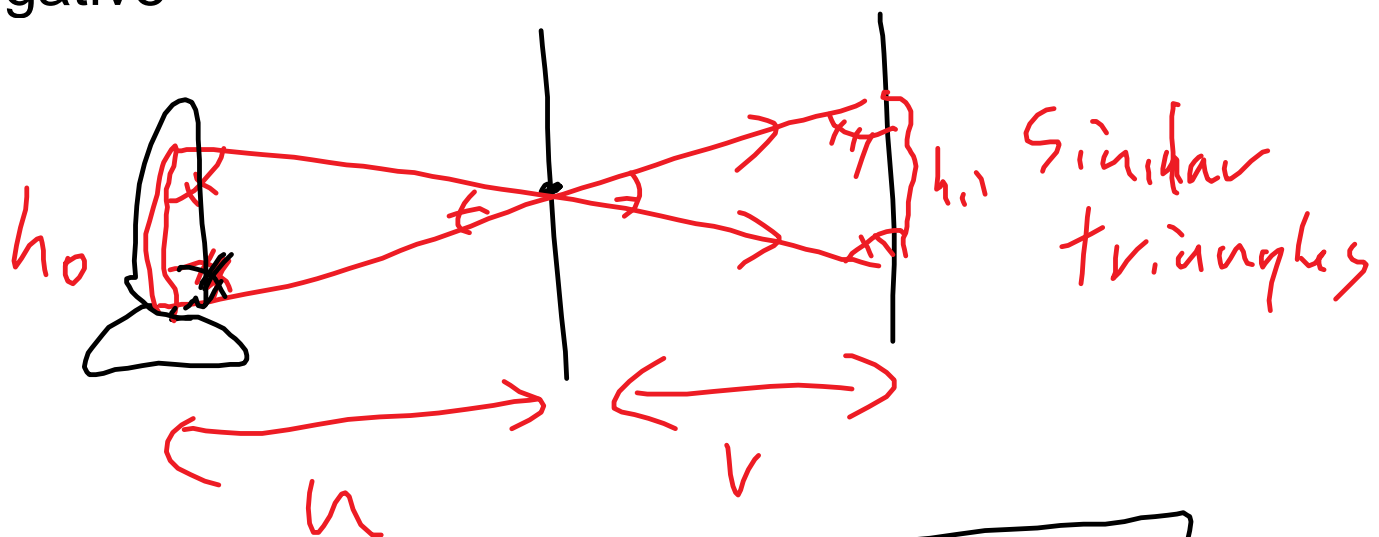
mirrors of the car, shoplifting or corners.
c) concave mirror

Observations:

Pinhole:

h_i increased with v , and h_o but decreased with u

$h_i/h_o = -v/u$ the image was flipped, so the h_i was negative



$$\text{linear magnification } m = \frac{h_i}{h_o} = -\frac{v}{u}$$

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Ray Diagrams - h_v u

curved mirrors:

concave: image is enlarged and upright if you are close, flipped if you are far.

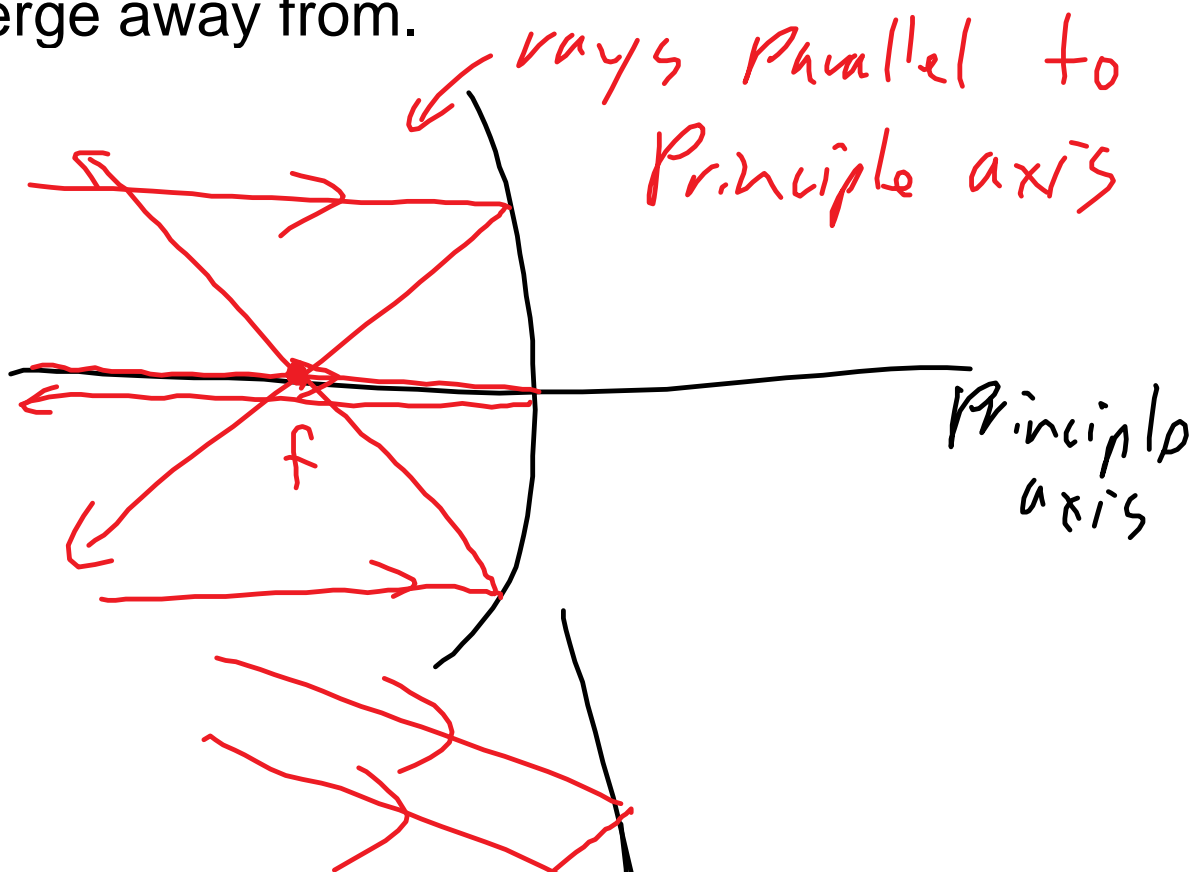
- you can take light from the window and project the image onto the wall - real image it is formed by light rays.

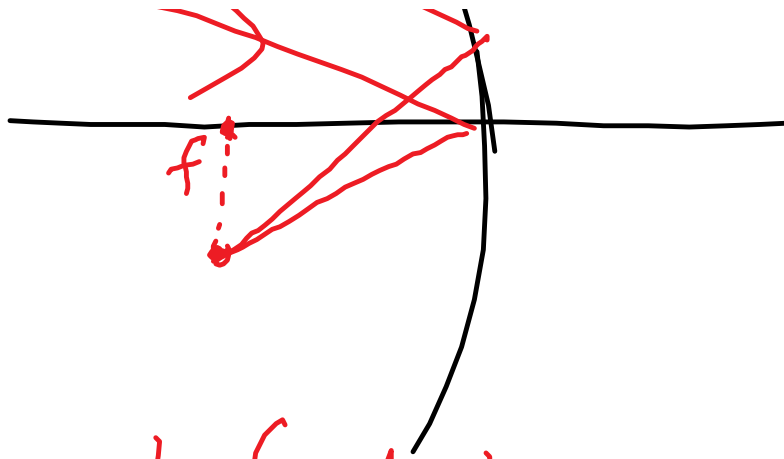
convex mirror: image is smaller. Virtual image, not put on a screen.

Define:

principle axis: line down the centre perpendicular to the curvature of the mirror/lens.

Focal point, f - where parallel rays converge to or diverge away from.





2 ways to find image

1. Sketch ray diagrams

2. lens maker's equation

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

p374 Q1-4 & read ray diagrams